

REMARKS

This is in response to the Office Action mailed September 21, 2009. Applicants thank the Examiner for the helpful telephonic discussion of October 7, 2009, during which the outstanding issues and proposed claim changes were discussed. Applicants believe that the present amendments to the claims place the application in condition for allowance by adopting the claim amendments suggestions discussed at the telephonic discussion.

After entry of this amendment, claims 45, 47-61 and 63-77 are pending. New claims 64-77 have been added and find support *inter alia* in the original claims. Further support for new claim 69 is found in the specification, for example, at page 4, lines 4-5, page 5, line 13, through page 6, line 2, page 13, lines 20-21, page 31, lines 14-16, and Examples 7-12. Further support for new claims 65, 73, and 77 is found in the specification, for example, at page 4, lines 4-5, page 13, lines 20-21, and page 31, lines 14-16. The claims have been amended without prejudice or disclaimer and find support *inter alia* in the original claims. Claims 45, 51 and 63 find further support in the specification, for example, at page 4, lines 4-5, page 13, lines 20-21, and page 31, lines 14-16. Claims 60 and 61 find further support in the specification, for example, at page 31, lines 14-16. Claims 47-50 and 52 have been amended without prejudice or disclaimer to correct the antecedent basis and find support *inter alia* in the original claims. No new matter has been added.

Claim Rejection – 35 U.S.C. § 103(a)

Claims 45 and 47-61 remain rejected under 35 U.S.C. § 103(a) as being obvious over Harper *et al.* (hereinafter “Harper”), in view of Sowa *et al.* (hereinafter “Sowa”), and further in view of Nykiforuk. Applicants respectfully disagree and traverse the rejection. However, to expedite prosecution, the claims have been amended without prejudice or disclaimer to recite the claimed methods with more specificity. In view of the present amendments and further in view of the telephonic discussion of October 7, 2009, Applicants respectfully request reconsideration and withdrawal of the rejection for the following reasons.

As discussed in the response dated June 19, 2009, Harper discloses clusters of genes that are regulated in response to a stress condition in plants, among which hemoglobin-coding genes are included. Harper further teaches production of transgenic plants expressing the disclosed

stress-regulated genes. See e.g., claim 29. According to Harper, the transgenic plants would exhibit altered responsiveness to a stress condition. However, Harper does not teach or suggest a method for increasing the production of starch and/or oil in a transgenic plant by overexpressing the disclosed genes, including the hemoglobin-coding genes. Nor does Harper teach or suggest the effect of overexpressing hemoglobin-coding genes in increasing the starch and/or oil content of transgenic plants.

As also discussed in the response dated June 19, 2009, Sowa teaches the potential functions of hemoglobin in plants and suggests that hemoglobin maintains energy status of the cell by facilitating glycolysis to generate ATP through substrate-level phosphorylation. See Abstract at p. 10317 and page 10320, left Col., end of the 1st paragraph. It is thus clear from reading Sowa that it does not teach or suggest a method for increasing the production of starch and/or oil as recited in the amended claims. Nor does Sowa teach or suggest the effect of overexpressing hemoglobin in transgenic plants, particularly in increasing the starch and/or oil content of the transgenic plants.

Similarly, as also discussed in the response dated June 19, 2009, Nykiforuk teaches diacylglycerol O-acyltransferase (DGAT) coding genes and their use in transgenic plants for increasing triacylglycerol (TAG) synthesis, seed oil content, and oil quality in plants. See Nykiforuk, Abstract. The Examiner's reliance on Nykiforuk is solely for teaching a method of recovering oil from a transgenic plant. Thus, it is apparent that this reference does not teach or suggest a method for increasing the production of starch and/or oil by overexpressing a hemoglobin-coding gene in a transgenic plant or the effect of overexpressing hemoglobin in a plant.

It follows that, Harper, Sowa, and Nykiforuk, alone or in combination, do not teach or suggest a method for increasing the production of starch and/or oil by overexpressing at least one hemoglobin in a transgenic plant as recited in the claims as amended. Because the cited references, alone or in combination, do not teach or suggest all the limitations of the amended claims, a *prima facie* case of obviousness has not been established.¹ Accordingly, the rejection

¹ The Examiner bears the initial burden of establishing *prima facie* obviousness. See *In re Rijckaert*, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). To support a *prima facie* conclusion of obviousness, the prior art must disclose or suggest all the limitations of the claimed invention. See *In re Lowry*, 32 F.3d 1579, 1582, 32 USPQ2d 1031, 1034 (Fed. Cir. 1994).

should be withdrawn for this reason alone.

The Examiner further identifies the difference between the cited references and the claimed methods as being the recovery of oil and/or starch from the resultant transformed plants. The Examiner thus contends that, since the plant species used in the cited references are commonly grown for starch and/or oil isolation, the isolation of starch and/or oil from the transgenic plants taught in the cited references would have been obvious based on the standard practice in the art as evidenced by Nykiforuk. Applicants respectfully disagree with the Examiner's characterization of the claimed subject matter. However, to expedite prosecution, the claims have been amended without prejudice or disclaimer to recite the claimed methods with more specificity. The amended claims now recite methods for increasing the production of starch and/or oil in a transgenic plant by overexpressing at least one hemoglobin, wherein the expression of the at least one hemoglobin results in an increase in starch and/or oil content in the transformed plant when compared with a wild-type control plant. As discussed above, none of the cited references, alone or in combination, teach or suggest the effect of overexpressing at least one hemoglobin in a transgenic plant, particularly in increasing the starch and/or oil content of the transgenic plant. Without such knowledge, one skilled in the art would not have been motivated to compare the starch and/or oil content of the transgenic plant with that of a wild-type control plant and to discover the unexpected property of hemoglobin when overexpressed in a transgenic plant. As such, one skilled in the art would not have been motivated to overexpress at least one hemoglobin in a plant with a reasonable expectation of success that the starch and/or oil content of the resultant transgenic plant would have been increased as compared with a wild-type control plant. For this additional reason, the rejection should be withdrawn.²

Because the cited references, alone or in combination, do not teach or suggest all the limitations of the claimed methods, and because the unexpected effect of overexpressing at least one hemoglobin in a plant in increasing the starch and/or oil content is evidence of nonobviousness, it is respectfully submitted that the cited references, alone or in combination, do not render the claims as amended obvious. For at least the above reasons, reconsideration and withdrawal of the rejection is respectfully requested.

² Applicants note that it has been well established that unexpected properties of a product or process can be evidence of nonobviousness in an analysis under 35 U.S.C. §103. See *In re Dillon*, 16 USPQ 2d 1897, 1901 (Fed. Cir. 1990).

CONCLUSION

In view of the present amendment and further in view of the above remarks, Applicants respectfully request withdrawal of the rejections and allowance of the claims. If any outstanding issues remain, the Examiner is invited to telephone the undersigned at the number given below.

Applicants reserve all rights to pursue the non-elected claims and subject matter in one or more divisional applications, if necessary.

Applicants are submitting their response within the three-month response period. No fee is believed due. However, if any fee is due, the Director is hereby authorized to charge our Deposit Account No. 03-2775, under Order No. 13311-00008-US from which the undersigned is authorized to draw.

Respectfully submitted,

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